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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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10/812,464

03/29/2004

John P. Barnak

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01/21/2005

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EXAMINER

BREWSTER, WILLIAM M

ART UNIT

PAPER NUMBER

2823

DATE MAILED: 01/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|--|--------------------------------------|--|
| Office Action Summary | Application No. 10/812,464 | Applicant(s) BARNAK ET AL. | |
| | Examiner William M. Brewster | Art Unit 2823 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 December 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2 are rejected under 35 U.S.C. 102(b) as being anticipated by Bacon et al., US Patent No. 5,234,153.

Bacon anticipates an apparatus, comprising:

in fig. 1, an adhesion layer, top of titanium layer, abutting a conductive pad, bottom of titanium layer (not shown), col. 5, lines 9-30;

a molybdenum-containing barrier layer 21-22 abutting said adhesion layer, col. 4, line 64 - col. 5, line 30;

a wetting layer 23 abutting said molybdenum-containing barrier layer, col. 4, line 64 - col. 5, line 8; and

high tin content solder material 23 abutting said wetting layer, col. 5, lines 36-54;

limitations from claim 2, the apparatus of claim 1, wherein said molybdenum-containing barrier layer comprises a material containing at least about 90% (atomic) molybdenum, col. 5, lines 9-30.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 3, 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bacon as applied to claims 1, 2 above, and further in view of Greer, US Patent No. 6,689,680 B2.

Bacon does not specify a tin content greater than 90%, but Greer does. Greer teaches in fig. 5, adhesion film 402, barrier film 404, wetting film 406, solder 502, col. 4, lines 36-66,

limitations from claim 3, the apparatus of claim 1, wherein said high tin content solder material comprises a material containing at least about 90% (by weight) tin, col. 5, lines 61- col. 6, line 13;

and proffers for evidence the limitations from claim 6, the apparatus of claim 1, wherein said wetting layer is substantially subsumed in said high tin content solder material forming an intermetallic compound layer, col. 5, lines 61- col. 6, line 13.

Greer gives motivation on col. 5, lines 61- col. 6, line 13. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to recognize that

combining Greer's invention with Bacon's invention would have been beneficial because higher tin-based solders can withstand higher temperature.

Claims 4, 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bacon as applied to claims 1, 2 above, and further in view of Tomono et al., US Publication No. 2004/0253803 A1.

Bacon does not specify using a low-k dielectric, but Tomono does. Tomono teaches in fig. 3 forming a contact pad 5, with adhesion layer 14A, barrier layer 14B, wetting material 14C, p. 4, ¶ 33,

limitations from claim 4, the apparatus of claim 1, further comprising said conductive pad 5 abutting at least one layer of low k dielectric material 12; limitations from claim 5, the apparatus of claim 4, wherein said at least one layer of low-k dielectric material comprises at least one layer of carbon doped oxide, p. 3, ¶ 5.

Tomono gives motivation on p. 4, ¶ 33. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to recognize that combining Tomono's invention with Bacon's invention would have been beneficial because it helps prevent exfoliation.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William M. Brewster whose telephone number is 571-272-1854. The examiner can normally be reached on Full Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 571-272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

William M. Brewster

19 January 2005
WB